

IV. *The metamorphosis of the Cypris into the young Lepas.*

1. The pupæ are chiefly caught at the very surface of the sea, where they swarm round the dead *Velællæ*, on which they settle. They rarely take to a colony of old barnacles.

2. Soon after settling the new cirri are formed underneath the natatory feet, the head grows out, the eyes are absorbed, and under the *Cypris*-shell the primordial valves of the young *Lepas* appear, which persist during its whole life. The *Cypris*-shell, with the old natatory feet, is then thrown off.

3. The young *Lepas* begins to form the complete shell, and fastens itself more and more by the copious secretions of its glands, which run through the outdrawn and enlarged head into the fixing-antennæ.

4. The cirri of the young *Lepas* develop a larger number of joints, the shell begins to lose its transparency, the body inside turns over a little, as has been described by Darwin, and the young *Lepas* is complete.

Conclusion.

1. As the young stages of the Lepadidæ are pelagic, it is only possible to work out their development at sea, and there at certain seasons. We found only once before the large *Nauplii* of *Lepas australis*. The development of no one of the Lepadidæ has hitherto been known in full; and it seems that even the adult larvæ of our commonest barnacles, such as *L. anatifera* and *L. aserifera*, are as yet unknown.

2. The *Nauplius* stages of *Lepas fascicularis* have not a different morphological value from those of *Balanus* and other genera; therefore there is no reason for giving to this stage a particular name. The term "*Archizoëa*" may remain as a remembrance of Dohrn's interesting discovery, but cannot be applied to the larvæ of other Lepadidæ.

H.M.S. 'Challenger,' Honolulu,
July 28, 1875.

III. "Preliminary Remarks on the Development of some Pelagic Decapods." By R. VON WILLEMÖES-SUHM, Ph.D., Naturalist to the 'Challenger' Expedition. Communicated by Prof. C. WYVILLE THOMSON, F.R.S. Received September 28, 1875.

Since we left Australia I have investigated the metamorphoses of some Crustacea which have been constantly caught by us on the surface of the tropical and subtropical parts of the Pacific. Though these investigations will be continued, I have now arrived at certain results which I think will not be uninteresting to zoologists. The genera to which these remarks refer are *Amphion*, *Sergestes*, and *Leucifer*.

Amphion Reynaudi has been on our lists as an animal "*incertæ sedis*" (Milne-Edwards) for nearly forty years, until Dohrn proved that a full-

grown specimen of it, which he dissected, was in possession of branchiæ and of an ovary, therefore no doubt a mature form. He also described one of its young stages, which has the number of appendages of a *Zoëa*, but in which caudal appendages are already developed.

On our voyages in the 'Challenger' we have caught several specimens of *Amphion* and of its larvæ; and I am now able to produce drawings, not only of the true *Zoëa* with a simple telson, but also of all the intermediate stages between it and the adult form with two, three, four, five, and six pairs of walking-legs. Of the full-grown *Amphion* I have examined three specimens, two of which are undoubtedly males, as the testes (and the branchiæ) were plainly visible, the former opening into the last pair of legs.

There is now no doubt that *Amphion* is not a larva, nay, even that there are several species and perhaps genera of this remarkable form. We have caught two very interesting mature animals which are certainly closely allied to *Amphion*. One of these has enormously long eye-stalks, which, having a length of 7 millims., are just as long as the whole animal's body. Another form has got very long eye-stalks too, but is especially remarkable for the antepenultimate joints of its pereopods, being large paddle-shaped organs, terminated by a very small end-joint. Both have got, like *Amphion*, a central (Naupliar) eye and eight pairs of branched legs; but their body is more *Sergestes*-like and less flat than that of *Amphion*. They certainly belong both to the same genus, and may be called *Amphiones* until more than one specimen of each has been obtained.

To me these *Amphionidæ* are especially interesting, as I can compare them with the larvæ of *Sergestes* and *Leucifer*, the former of which have also got eight pairs of branched legs and the central eye which persists in the *Amphionidæ*. There are good reasons for the statement that the larvæ of *Leucifer* and *Sergestes* pass through an *Amphion* stage; and this, it seems to me, throws a good deal of light on the relations and systematic position of *Amphion* itself.

Dohrn, to whom we owe so many fine discoveries concerning the pelagic Crustacea, has described *, under the name of *Elaphocaris*, a small and very spiny *Zoëa* caught in the harbour of Messina. He calls it the larva of a Decapod without fixing its position. This small larva was often seen by me in the Atlantic; but I only lately found out that *Elaphocaris* is the larva of a species, or rather of some species, of *Sergestes*. There is, however, one species of this genus in which the *Zoëa* is not an *Elaphocaris*, but a larger, less spiny form, similar, however, in all other respects to the former. Of the species which develops with an *Elaphocaris* stage in the Western Pacific, I have collected numerous specimens of all the stages, from the youngest *Zoëas* up to the mature animal. The

* V. Siebold und Kolliker, Zeitschrift für wissenschaftliche Zoologie, Band xx, p. 662, tab. 31. fig. 28.

mode of development is very simple. After the first moulting the larva gets six more branched legs and loses many spines. It enters the *Amphion* stage, then moults, throws the branched legs off, gets branchial, and becomes a young *Sergestes*. Only after this last moulting the central eye, hitherto present, disappears.

And very similar to that of *Sergestes* is the development of *Leucifer*. Here the earliest *Zoëa* of a species from the Western Pacific has got at first no eyes, then sessile ones come out, and the animal then presents the form which Dana has called *Erichthina demissa*, and which Claus suspected to be not a Stomatopod but a Schizopod larva. After the second moulting this *Erichthina* gets stalked eyes and very long setæ on all its appendages, becoming a rather long, very delicate *Zoëa*. It now enters the *Amphion* stage, but never gets more than four pairs of pereopods, and loses another pair of these when it moults for the youngest *Leucifer* stage, in which two pairs of pereopods are absent.

The next question, after having found this out, was, of course, whether *Amphion*, *Sergestes*, and *Leucifer* leave the egg as a *Zoëa*, or whether there is a preceding *Nauplius* stage. My own impression is that in the two first-named genera this is not the case, as the youngest *Zoëas* which I caught had all the same size, and as none of them was without the large lateral stalked eyes. As for *Leucifer*, the question appears to me to be doubtful; for it is, from what I have seen, quite possible that my youngest *Zoëa*, which has only got a central eye, may be preceded by a *Nauplius*. Of course the simplest thing would be to get the eggs; but there is the difficulty, for *Amphion* is caught very rarely, and has never been obtained at any other time but between 8 and 12 p.m., when it is extremely difficult by lamplight to find out the youngest stages. *Sergestes* larvæ are commoner, appearing also in the daytime, and *Leucifer* is sometimes caught in abundance. I hope, therefore, that I shall succeed in completing my researches about this question, especially as far as the two latter genera are concerned.

H.M.S. 'Challenger,' Honolulu, Sandwich Islands,
July 30, 1875.

December 16, 1875.

Dr. J. DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—